Geometry Notes

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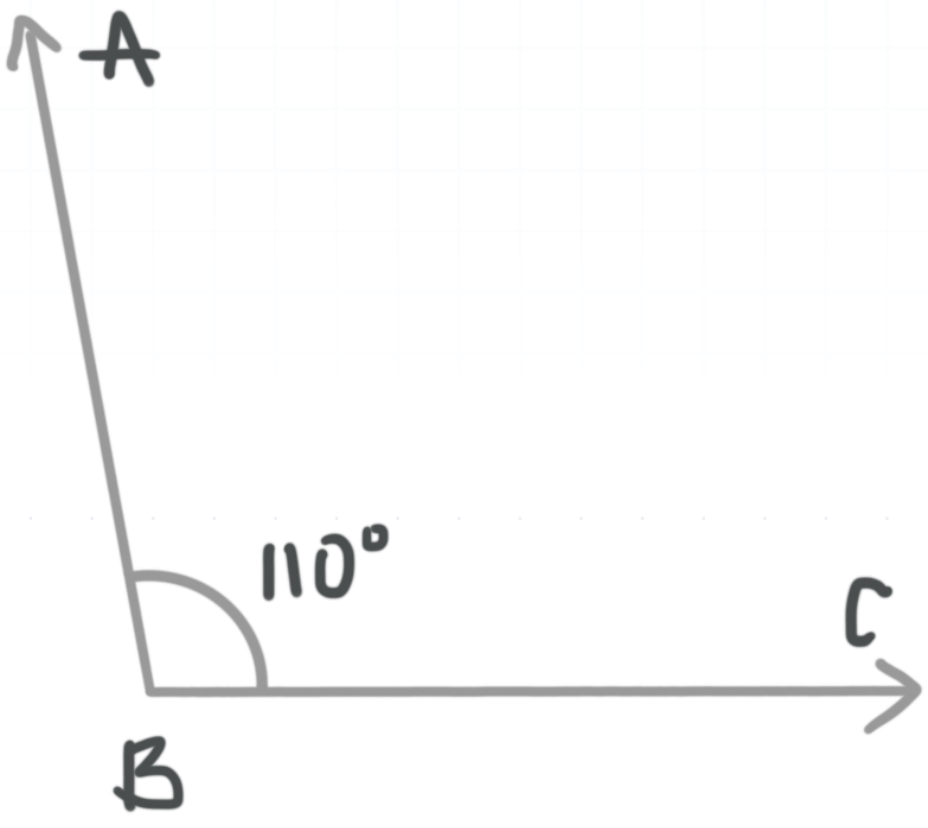
MATH

Measures of angles

In this lesson we'll look at how to find the measures of angles, in degrees, algebraically.

The measure of angles

An angle is a fraction of a circle, the turn of the angle is measured in degrees (or radians).



The name of this angle is $\angle ABC$. When we talk about the measure of the angle we use an m in front of the angle sign, $m\angle ABC = 110°$.

Angle addition

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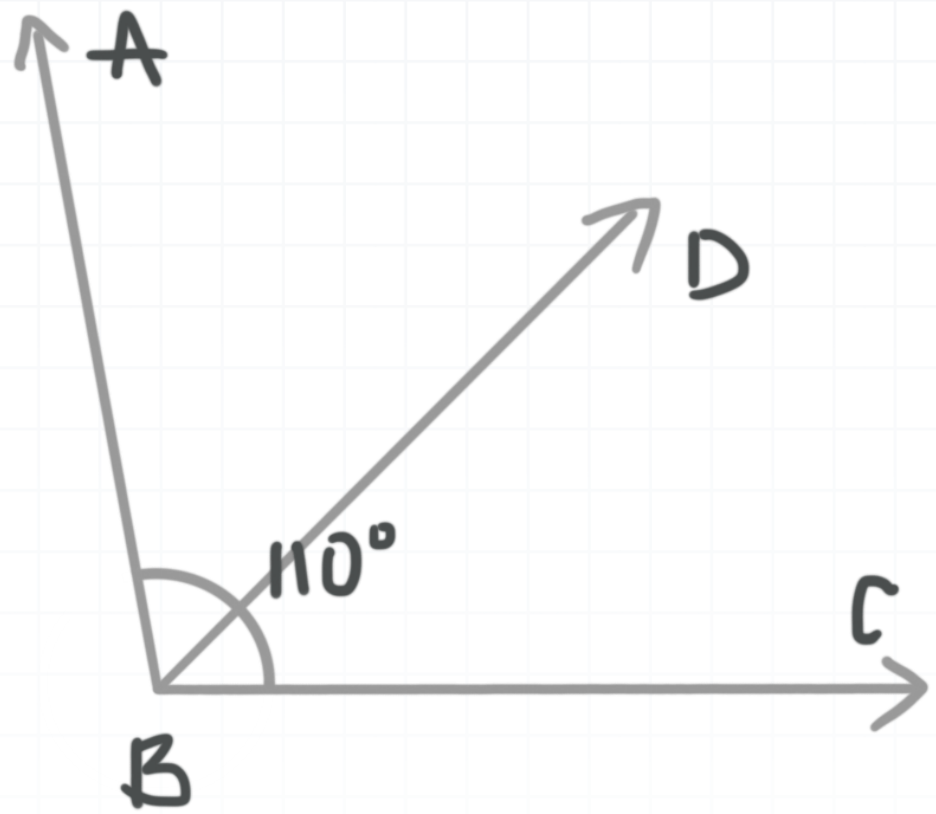
The parts of an angle add to the entire angle.



Here you can see that $m\angle ABC = m\angle ABD + m\angle DBC$. This means if you know $m\angle DBC = 55°$ and $m\angle ABC = 110°$ you can find $m\angle ABD$.

$$m\angle ABC = m\angle ABD + m\angle DBC$$

$$110° = m\angle ABD + 55°$$

$$55° = m\angle ABD$$

Let's do a few examples.

Example

If $m\angle AED = 80°$ and $m\angle AEB = 30°$, what is $m\angle BEC$?

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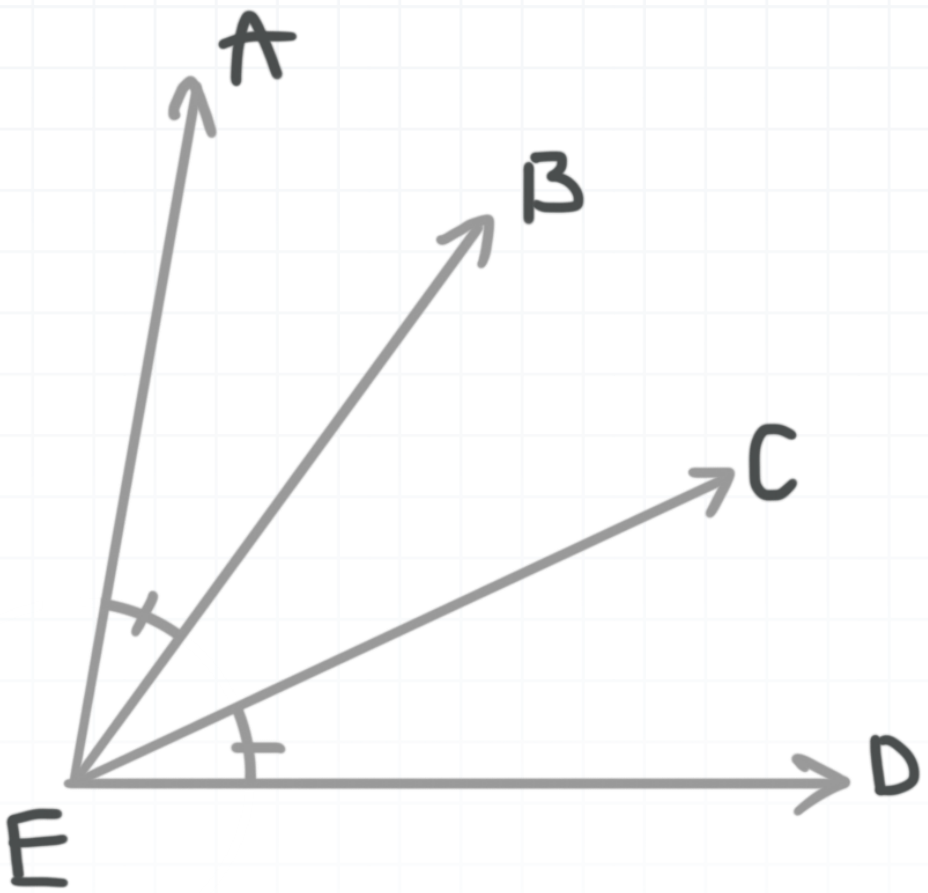

Let's organize what we know. Looking at the diagram we can see that $\angle AEB$ is congruent to $\angle CED$. So we know both angles measure the same, $m\angle AEB = m\angle CED = 30°$.

We also know the measure of the entire angle $m\angle AED = 80°$. Also $m\angle AED = m\angle AEB + m\angle BEC + m\angle CED$. Let's rename $m\angle BEC$ with the variable x. Then we get

$$m\angle AED = m\angle AEB + m\angle BEC + m\angle CED$$

$$80° = 30° + x + 30°$$

$$80° = 60° + x$$

$$x = 20°$$

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So $m\angle BEC = 20°$.

Here's another type of problem you might see.

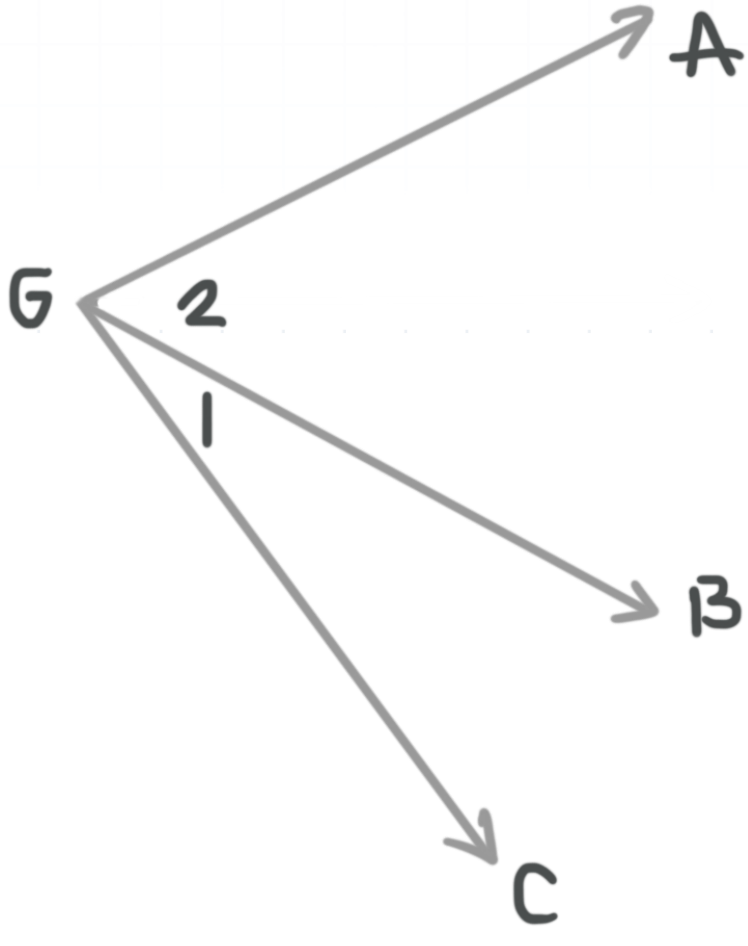
Example

Find the angle measure of $\angle 2$ in degrees.

$$m\angle 1 = 2x°$$

$$m\angle 2 = 5x° + 5°$$

$$m\angle AGC = 105° - 3x°$$



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We can set up an equation, solve for x, then substitute back in to find $m\angle 2$.

$$m\angle 1 + m\angle 2 = m\angle AGC$$

$$2x^\circ + 5x^\circ + 5^\circ = 105^\circ - 3x^\circ$$

$$7x^\circ + 5^\circ = 105^\circ - 3x^\circ$$

$$7x^\circ + 3x^\circ + 5^\circ = 105^\circ$$

$$10x^\circ + 5^\circ = 105^\circ$$

$$10x^\circ = 100^\circ$$

$$x^\circ = 10^\circ$$

Substituting into $m\angle 2 = 5x^\circ + 5^\circ$, we get $m\angle 2 = 5(10)^\circ + 5^\circ = 55^\circ$.

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